



# UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
-----------------	-------------	----------------------	---------------------	------------------

10/603,077

06/25/2003

Akihiko Otoguro

030757

1877

38834

7590

07/15/2004

WESTERMAN, HATTORI, DANIELS & ADRIAN, LLP  
1250 CONNECTICUT AVENUE, NW  
SUITE 700  
WASHINGTON, DC 20036

EXAMINER

NOVACEK, CHRISTY L

ART UNIT

PAPER NUMBER

2822

DATE MAILED: 07/15/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

10/603,077

Applicant(s)

OTOGURO ET AL.

Examiner

Christy L. Novacek

Art Unit

2822

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 25 June 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-25 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-14, 16-19 and 22-25 is/are rejected.
- 7) ☒ Claim(s) 15, 20 and 21 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date 6/25/03
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_

### DETAILED ACTION

This office action is in response to the communication filed June 25, 2003.

#### *Claim Rejections - 35 USC § 102*

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claims 1, 7, 8, 12-14 and 22 are rejected under 35 U.S.C. 102(e) as being anticipated by Thakar et al. (US 6,624,068).

Regarding claims 1 and 22, Thakar discloses forming a laminated film for pattern formation on a substrate (100) wherein the laminated film includes an innermost layer (103) having an extinction coefficient of 0.77-1.07, an inner layer (104) having an extinction coefficient of 0.3-0.4 and a surface layer (105) (Fig. 1-2; col. 3, ln. 22 – col. 4, ln. 21).

Regarding claim 7, Thakar discloses that the extinction coefficient of the inner layer is obtained when a light having wavelength of 193 nm is irradiated to the inner layer (col. 5, ln. 65 – col. 6, ln. 33).

Regarding claim 8, Thakar discloses that the light having a wavelength of 193nm is an ArF excimer laser light (col. 5, ln. 4-7).

Art Unit: 2822

Regarding claim 12, Thakar discloses that the surface layer is an ArF excimer laser resist (col. 5, ln. 4-7).

Regarding claim 13, Thakar discloses that the photoreflectance of the innermost layer and inner layer together is less than 1% (col. 4, ln. 11-16). Thakar does not specifically disclose that the reflectance of the inner layer is less than 2.0%. However, Thakar discloses using an inner ARC layer which has an extinction coefficient within the range of that disclosed by Applicants. Therefore, it appears that the inner layer of Thakar would inherently possess the function of having a photoreflectance of 2.0% or less. See *In re Swinehart*, 439 F.2d 210, 212-13, 169 USPQ 226, 229 (CCPA 1971) "where the Patent Office has reason to believe that a functional limitation asserted to be critical for establishing novelty in the claimed subject matter may, in fact, be an inherent characteristic of the prior art, it possesses the authority to require the applicant to prove that the subject matter shown to be in the prior art does not possess the characteristics relied on "); and *In re Fitzgerald*, 619 F.2d 67, 205 USPQ 594 (CCPA 1980) (a case indicating that the burden of proof can be shifted to the applicant to show that the subject matter of the prior art does not possess the characteristic relied on whether the rejection is based on inherency under 35 U.S.C. 102 or obviousness under 35 U.S.C. 103).

Regarding claim 14, Thakar discloses that the photoreflectance of the innermost and inner layers together is less than 1.0%. Thakar does not specifically disclose that the change in photoreflectance over thickness is 50 %/ $\mu\text{m}$ . However, Thakar discloses using innermost and inner ARC layers which have extinction coefficients within the range of that disclosed by Applicants. Therefore, it appears that the ARC layers of Thakar would inherently possess the function of having a change in photoreflectance of 50%/ $\mu\text{m}$  or less. See *In re Swinehart*, 439

Art Unit: 2822

F.2d 210, 212-13, 169 USPQ 226, 229 (CCPA 1971) “where the Patent Office has reason to believe that a functional limitation asserted to be critical for establishing novelty in the claimed subject matter may, in fact, be an inherent characteristic of the prior art, it possesses the authority to require the applicant to prove that the subject matter shown to be in the prior art does not possess the characteristics relied on ”); and *In re Fitzgerald*, 619 F.2d 67, 205 USPQ 594 (CCPA 1980) (a case indicating that the burden of proof can be shifted to the applicant to show that the subject matter of the prior art does not possess the characteristic relied on whether the rejection is based on inherency under 35 U.S.C. 102 or obviousness under 35 U.S.C. 103).

Claims 1-6, 22 and 23 are rejected under 35 U.S.C. 102(e) as being anticipated by Linliu et al. (US 6,479,401).

Regarding claims 1 and 22, Linliu discloses forming a laminated film for pattern formation on a substrate (100) wherein the laminated film includes an innermost layer (122) having an extinction coefficient of 0.1-0.8, an inner layer (124) having an extinction coefficient of 0.01-0.5 and a surface layer (130) (Fig. 2; col. 3, ln. 30 – col. 4, ln. 3).

Regarding claim 2, Linliu discloses that the extinction coefficient of the inner layer is 0.01-0.5.

Regarding claim 3, Linliu discloses that the inner layer is 100-1000 Å (0.01-0.1 µm) thick (col. 3, ln. 30-34).

Regarding claims 4 and 23, Linliu discloses forming a laminated film for pattern formation on a substrate wherein the laminated film includes an innermost layer (122) having an extinction coefficient of 0.1-0.8, an inner layer (124) having an extinction coefficient of 0.01-0.5 and a surface layer (130) (Fig. 2; col. 3, ln. 30 – col. 4, ln. 3).

Regarding claim 5, Linliu discloses that the extinction coefficient of the inner layer is 0.01-0.5.

Regarding claim 6, Linliu discloses that the inner layer is 100-1000 Å (0.01-0.1 µm) thick (col. 3, ln. 30-34).

Claims 1, 2, 7 and 22 are rejected under 35 U.S.C. 102(b) as being anticipated by Tabara et al. (US 6,348,404).

Regarding claims 1 and 22, Tabara discloses forming a laminated film for pattern formation on a substrate (10) wherein the laminated film includes an innermost layer (16) having an extinction coefficient of 1.5, an inner layer (18) having an extinction coefficient of 0.23 and a surface layer (20) (Fig. 4; col. 2, ln. 45 – col. 3, ln. 60; col. 6, ln. 36-50).

Regarding claim 2, Tabara discloses that the inner layer has an extinction coefficient of 0.23.

Regarding claim 7, Tabara discloses that the extinction coefficient of the inner layer is obtained when a light having a wavelength of 248 nm is irradiated to the inner layer (col. 3, ln. 50-59).

Claims 4-8, 12-14 and 23 are rejected under 35 U.S.C. 102(b) as being anticipated by Kim (US 6,352,922).

Regarding claims 4 and 23, Kim discloses forming a laminated film for pattern formation on a substrate (100) wherein the laminated film includes an innermost layer (108) having an extinction coefficient of 0.01-0.21, an inner layer (110) having an extinction coefficient of 0.05-0.8 and a surface layer (112) (Fig. 6; col. 4, ln. 15 – col. 5, ln. 7).

Art Unit: 2822

Regarding claim 5, Kim discloses that the extinction coefficient of the inner layer is 0.05-0.8.

Regarding claim 6, Kim discloses that the inner layer is 100-2000 Å (0.01-0.2 µm) thick (col. 4, ln. 60-62).

Regarding claim 7, Kim discloses that the extinction coefficient of the inner layer is obtained when a light having a wavelength of 193 nm is irradiated to the inner layer (col. 5, ln. 52-58).

Regarding claim 8, Kim discloses that the light having the wavelength of 193 nm is an ArF excimer laser light (col. 5, ln. 52-58).

Regarding claim 12, Kim discloses that the surface layer is an ArF excimer laser resist (col. 5, ln. 52-58).

Regarding claim 13, Kim discloses that the photorefectance of the innermost layer and inner layer together is less than 3% (col. 5, ln. 65-67). Kim does not specifically disclose that the reflectance of the inner layer is less than 2.0%. However, Kim discloses using an inner ARC layer which has an extinction coefficient within the range of that disclosed by Applicants. Therefore, it appears that the inner layer of Kim would inherently possess the function of having a photorefectance of 2.0% or less. See *In re Swinehart*, 439 F.2d 210, 212-13, 169 USPQ 226, 229 (CCPA 1971) “where the Patent Office has reason to believe that a functional limitation asserted to be critical for establishing novelty in the claimed subject matter may, in fact, be an inherent characteristic of the prior art, it possesses the authority to require the applicant to prove that the subject matter shown to be in the prior art does not possess the characteristics relied on”; and *In re Fitzgerald*, 619 F.2d 67, 205 USPQ 594 (CCPA 1980) (a case indicating that the

Art Unit: 2822

burden of proof can be shifted to the applicant to show that the subject matter of the prior art does not possess the characteristic relied on whether the rejection is based on inherency under 35 U.S.C. 102 or obviousness under 35 U.S.C. 103).

Regarding claim 14, Kim discloses that the photoreflectance of the innermost and inner layers together is less than 3.0%. Kim does not specifically disclose that the change in photoreflectance over thickness is 50 %/ $\mu\text{m}$ . However, Kim discloses using innermost and inner ARC layers which have extinction coefficients within the range of that disclosed by Applicants. Therefore, it appears that the ARC layers of Kim would inherently possess the function of having a change in photoreflectance of 50%/ $\mu\text{m}$  or less. See *In re Swinehart*, 439 F.2d 210, 212-13, 169 USPQ 226, 229 (CCPA 1971) "where the Patent Office has reason to believe that a functional limitation asserted to be critical for establishing novelty in the claimed subject matter may, in fact, be an inherent characteristic of the prior art, it possesses the authority to require the applicant to prove that the subject matter shown to be in the prior art does not possess the characteristics relied on"); and *In re Fitzgerald*, 619 F.2d 67, 205 USPQ 594 (CCPA 1980) (a case indicating that the burden of proof can be shifted to the applicant to show that the subject matter of the prior art does not possess the characteristic relied on whether the rejection is based on inherency under 35 U.S.C. 102 or obviousness under 35 U.S.C. 103).

Claims 16 and 25 are rejected under 35 U.S.C. 102(e) as being anticipated by Ding et al. (US 6,630,397).

Regarding claims 16 and 25, Ding discloses forming a laminated film for pattern formation on a substrate (10) wherein the laminated film includes an innermost layer (20), an inner layer (25) and a surface layer (32) and the innermost layer is formed by coating a



Art Unit: 2822

composition for the innermost layer on the substrate and baking at 400-600°C (col. 5, ln. 63 – col. 6, ln. 13).

***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claim 9 is rejected under 35 U.S.C. 103(a) as being unpatentable over Tabara et al. (US 6,348,404) in view of Zhang et al. (US 20040029395).

Regarding claim 9, Tabara discloses forming the inner layer of an organic ARC material but does not disclose that the layer is made of a polysiloxane compound (col. 3, ln. 17-20). Zhang teaches a method of forming a polysiloxane organic ARC layer for a substrate which has the beneficial property of leaving behind no residue or particulates which have the potential to cause defects on the substrate (Abstract; para. 41). The siloxanes disclosed by Zhang meet the limitations of claim 9. At the time of the invention, it would have been obvious to one of ordinary skill in the art to use the ARC formula of Zhang to form the ARC of Tabara because Zhang's ARC formulation offers the benefit of not leaving any defect-causing residue or particulates on the substrate surface.

Claims 10, 11, 17-19 and 24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ding et al. (US 6,630,397) in view of Zhang et al. (US 20040029395).

Art Unit: 2822

Regarding claims 10 and 24, Ding discloses forming a laminated film for pattern formation on a substrate (10) wherein the laminated film includes an innermost layer (20), an inner layer (26) and a surface layer (32) (Fig. 3; col. 4, ln. 55 – col. 6, ln. 13). Ding discloses that the ARC layer is advantageously formed of an organic polymer but Ding does not teach any specific formula or method of forming the ARC layer (col. 2, ln. 3-5). Zhang teaches a method of forming a polysiloxane organic ARC layer for a substrate which has the beneficial property of leaving behind no residue or particulates which have the potential to cause defects on the substrate (Abstract; para. 41). The siloxanes disclosed by Zhang meet the limitations of claim 10. At the time of the invention, it would have been obvious to one of ordinary skill in the art to use the ARC formula of Zhang to form the ARC of Ding because Zhang's ARC formulation offers the benefit of not leaving any defect-causing residue or particulates on the substrate surface.

Regarding claim 11, Zhang discloses that the materials disclosed in US Pat. No. 6,365,765 (Baldwin et al.) can be used to form the ARC layer. Baldwin discloses ARC layers made of polysiloxanes having light-absorbant groups including aromatic groups.

Regarding claims 17-19, for the reasons stated above in reference to claims 10 and 24, it would have been obvious to one of ordinary skill in the art to form the ARC of Ding according to the method specified by Zhang. Zhang discloses that the composition for forming the ARC includes a surfactant additive such as SURFYNOL (trademarked) (para. 33). The surfactant SURFYNOL has an evaporation point of 262 degrees Celsius. Ding discloses heating the ARC between 400-600 degrees Celsius. Therefore, when the ARC is heated at a temperature of 262 degrees Celsius and above, the surfactant will evaporate from the ARC film.

*Allowable Subject Matter*

Claims 15, 20 and 21 are objected to as containing allowable subject matter but are dependent upon a rejected claim.

The primary reason for the indication of the allowable subject matter of claim 15 is the inclusion therein, in combination as currently claimed, of the limitation of forming a series of layers for pattern formation that is made of an innermost layer with a particular extinction coefficient, an inner layer having a particular extinction coefficient and a surface layer, wherein the innermost layer is baked at 300 degrees Celsius or more. This limitation is found in claim 15 and is neither disclosed nor taught by the prior art of record, alone or in combination.

The primary reason for the indication of the allowable subject matter of claim 20 is the inclusion therein, in combination as currently claimed, of the limitation of forming a series of layers for pattern formation that is made of an innermost layer, an inner layer and a surface layer, baking the substrate at 300 degrees Celsius or more and also baking the inner layer at less than 300 degrees Celsius. This limitation is found in claim 20 and is neither disclosed nor taught by the prior art of record, alone or in combination.

The primary reason for the indication of the allowable subject matter of claim 21 is the inclusion therein, in combination as currently claimed, of the limitation of forming a series of layers for pattern formation that is made of an innermost layer of a thermosetting novolak resin, an inner layer and a surface layer and baking the substrate at 300 degrees Celsius or more. This limitation is found in claim 21 and is neither disclosed nor taught by the prior art of record, alone or in combination.

***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Christy L. Novacek whose telephone number is (571) 272-1839. The examiner can normally be reached on Monday-Thursday and alternate Fridays 7:30 - 5:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Amir Zarabian can be reached on (571) 272-1852. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

CLN  
July 12, 2004



Michael Trinh  
Primary Examiner  
Act SPE